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GROWTH OPPORTUNITIES FOR YOUNG WESTERN LARCH

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ABSTRACT

Young western larch stands commonly overstock and have as many as 30,000 to 40,000 trees per acre. A typical 9-year-old larch stand showed that individual tree growth and crown development were far better where stocking rates were not this heavy. Dominant larch grew twice as much in diameter and one-third more in height on plots having 5,000 trees per acre as they did on plots with 35,000 trees per acre. Very early thinning is recommended for heavily overstocked larch stands.

Western larch characteristically overstocks. Young stands of this highly intolerant species commonly reach stocking rates of 30,000 to 40,000 stems per acre and stocking of 100,000 trees per acre has been recorded. Obviously, where stocking is this heavy, trees compete vigorously for the available water, nutrients, and light. Such competition seriously reduces individual tree growth and development.

Programs of stand improvement must aim at preventing early limitations of growth resulting from overstocking. Past studies show serious consequences in larch stands that were not thinned or where thinning was delayed too long (Roe and Schmidt 1965). For example, dominant trees in a stand stocked with about 5,000 trees per acre at age 30 grew at only one-third of their potential rate from age 30 to 57. Thinning a similar adjacent stand at age 30 increased both diameter and height growth, but growth lost before thinning was substantial and was not regained during the 27-year period after thinning. Trees responded slowly after thinning because 30 years of overstocking had reduced the general vigor and crown size of the trees.

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Thus, overstocked larch stands must be thinned very early to prevent loss of growth and vigor. However, forest managers ask the question: how early in the life of the stand does overstocking begin restricting growth of individual crop trees? The study reported here helps answer that question. It describes the stand density-growth relations in a typical 9-year-old larch stand. Briefly, it shows that even at this early age individual trees grow far better where stocking is lighter and demonstrates the urgency of thinning very early in heavily overstocked larch stands.

DESCRIPTION OF STUDY AREA AND METHODS

The study area was located on the Coram Experimental Forest in northwestern Montana at an elevation of about 3,800 feet. Slope, aspect, soil, and ecological habitat type were relatively uniform throughout the area. All study plots were situated on gently sloping, north-facing aspects. The soil, a brown podzolic, was classified in the Waits series. The entire area can be classified as a Picea-Abies/Pachistima ecological habitat type (Daubenmire 1952). Site productivity was medium for larch; site index 58 feet at 50 years (Cummings 1937). The stand throughout the study area regenerated naturally from the heavy larch seed crop of 1952 following clearcutting and prescribed burning. At the time these plots were measured, the stand was 9 years old (fig. 1).

Individual tree measurements included diameters at breast height, total heights, and crown lengths of the 20 tallest larch in each of twenty-six 1/10-acre plots. Stand densities, determined for each 1/10-acre plot by a sample of ten 1-milacre quadrats, ranged from 5,000 to 37,000 trees per acre; larch accounted for 88 percent of the stocking.

Regression analyses were used for plotting the stand density-growth curves.

Figure 1.--Typical 9-year-old larch stand on the study area. This stand is stocked with 23,000 trees per acre--far too many for optimum growth and development.

RESULTS

Dominant larch grew fastest in diameter and height and retained fullest crowns in stands having the fewest trees during the first 9 years of their lives (fig. 2). Stand density and individual tree development of the 200 largest trees per acre were related as follows:

1. Diameter growth showed the greatest effect of overstocking. Average diameters ranged from about 0.3 inch on plots having 35,000 trees per acre up to about 0.6 inch on those having 5,000 trees--a 100-percent difference in diameter.

2. Height growth showed the same effect as diameter, but the differences were not as great. Heights of the dominant trees averaged 6 feet on plots that had 35,000 trees per acre and 8 feet where there were only 5,000 trees per acre--a 33-percent difference in height.

3. Crown length, as a percent of total height, showed the same relation to stand density as diameter and height; crowns were longest on the least dense plots. Longer crowns were readily apparent on the less dense plots even though the absolute differences in crown length were not great. Average crown lengths ranged from 87 percent of total height on heavily stocked plots up to 97 percent on the lightly stocked plots--a 10-percent difference in crown length.

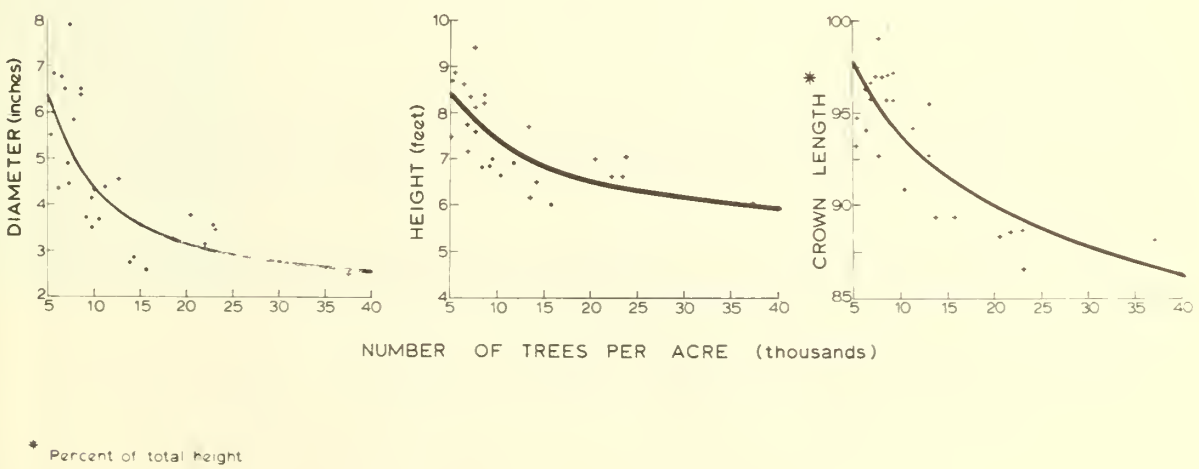

Figure 2.--Effects of density on 9-year-old larch stands.

DISCUSSION

Western larch grows faster and retains a fuller crown where stocking rates are lighter, even in stands as young as 9 years old. Measured differences in growth of the dominant trees up to this age are not great, but percentage differences are substantial. For example, if the present diameter growth ratios in these stands are maintained, crop trees in the less densely stocked areas will average 10 inches about the same time those in the most densely stocked stands average 5 inches. All evidence indicates that these differences in growth rate will continue and will likely become progressively greater as the stands grow older.

Crown losses on these young trees demonstrate the extreme shade intolerance of larch and are symptomatic of overstocking. Some natural pruning of larch is desirable, but excessive crown losses from pruning can reduce the general vigor and growth of the stand.

The growth and stand density relations shown in this study emphasize the management opportunities available in young larch stands and demonstrate that even at this early age these stands are not immune to the effects of overstocking. Growth potential for larch apparently far exceeds its normal growth in natural unmanaged stands. The shape of the curves (fig. 2) demonstrates the wide difference in individual tree growth and implies that dominant trees would have grown much faster in stands having fewer than 5,000 trees per acre--the lowest density represented in this study.

By thinning early, even before the trees are 9 years old, forest managers can take full advantage of the rapid juvenile growth characteristic of larch. Early thinning allows selected trees to adjust easily to added growing space and to maintain good growth. Delay in thinning permits growth losses to accumulate rapidly, allows the trees to degenerate in vigor, and consequently impedes their ability to respond to increased growing space after thinning.

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